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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/384,971	08/30/1999	MASAHIKO KUBOTA	35.C13752	8550

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EXAMINER

BROOKE, MICHAEL S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 03/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/384,971

Applicant(s)

KUBOTA ET AL.

Examiner

Michael S. Brooke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 18 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,4,5,9-11,14,15 and 19-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4,5,9-11,14,15 and 19-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 4, 5, 9, 21/1 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. (5,660,739) in view of Shirato et al. (4,458,256).

Ozaki et al. teaches an ink jet print head comprising a heat generating element (107) that is connected to a pair of electrodes (103, 104) and which discharges ink from a discharge port (1111). As discussed at col. 5:32, a first protective coating (108a), made of PSG, is provided over the heat generating element. The PSG coating is etched with a solution of buffered fluoric acid (hydrofluoric acid). After the PSG layer has been etched away, a second protection layer, made of SiN, is deposited over the PSG layer and the etched portion. As can be seen in Fig. 2, this results in a structure, wherein the protective coating has a first region that is formed from two layers and has a substantially uniform thickness along a direction connecting the pair of electrodes and a second region that is formed of a single layer, has a substantially uniform thickness along a direction connecting the pair of electrodes and is stepwise thinner than the first region. Looking at Figs. 2 and 7, it can be seen that the second region is closer to the nozzle than the first region. Ozaki et al. further teaches that the heat generating

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element is made of TaN, which inherently has a positive temperature coefficient. Fig. 8 illustrates a member (HC) for mounting the print head.

Ozaki et al. teaches the claimed invention with the exception of varying the energy applied to the heat generating element to change the volume of the ink droplet.

Shirato et al. teaches that it is known in the ink jet art to vary the amount of energy applied to the heat generating element in order to vary the size of the ink droplet (col. 4:28-41). By recording with different drop sizes, an image having different print densities can be formed.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Ozaki with means to change the volume of the ink drop by varying the energy applied to the heater, so that an image having different printing densities can be formed, as taught by Shirato et al.

The steps of the method of claim 22 are deemed to be obvious in view of the functions of the combination described above, in that when the combination performs its intended functions, it would necessarily perform the claimed method steps.

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. (5,660,739) in view of Shirato et al. (4,458,256), as applied to claims 1, 4, 5, 9 and 21/1 above, and further in view of Matsumoto (4,429,321).

Ozaki et al., as modified, teaches the claimed invention with the exception of a driving circuit having a plurality of function devices for driving the heat generating elements provided with the substrate.

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Matsumoto teaches an ink jet head comprising an epitaxial layer (119) which is a substrate. The substrate contains a plurality of function elements (11) which drive the heat generating elements (105). Integrating the function devices into the substrate provides the advantage of improving printing speed and recording element density col. 1:26-54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Ozaki et al., as modified, with function elements in the substrate which drive the heat generating elements for the purpose of improving printing speed and density, as taught by Matsumoto.

4. Claims 11, 14, 15, 21/11 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. (5,660,739) in view of Shirato et al. (4,458,256) and Nakata et al. (EP-764,531).

Ozaki et al., as modified, teaches the claimed invention, as discussed above, with the exception of a moving member.

Nakata et al. teaches an ink jet print head comprising a moving member (31) for the purpose of directing the propagation of the pressure wave toward the ejection outlet, thereby increasing ejection efficiency, ejection force and ejection speed (see Summary).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided Ozaki et al, as modified, with a moving member for the purpose of directing the propagation of the pressure wave toward the ejection outlet, thereby increasing ejection efficiency, ejection force and ejection speed, as taught by Nakata et al.

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The steps of the method of claim 23 are deemed to be obvious in view of the functions of the combination described above, in that when the combination performs its intended functions, it would necessarily perform the claimed method steps.

5. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. (5,660,739) in view of Shirato et al. (4,458,256) and Nakata (EP-764531), as applied to claims 11, 14, 15 and 21/11 above, and further in view of Murthy et al. (5,658,471).

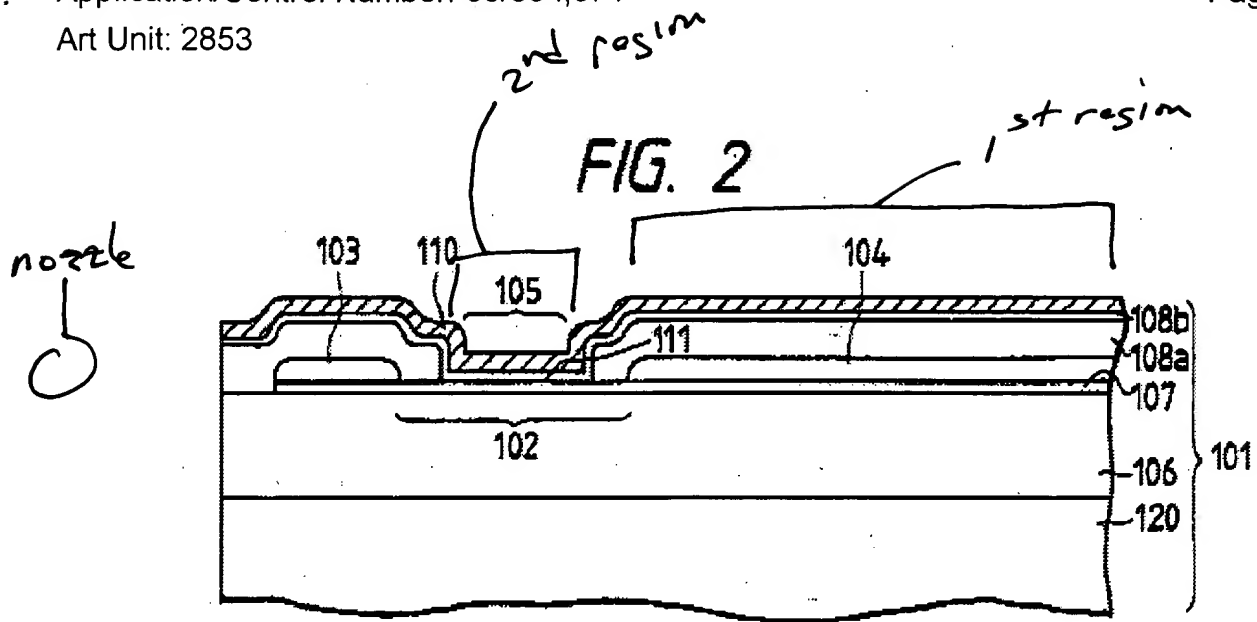
Ozaki et al., as modified, teaches the claimed invention with the exception of the heat generating element being composed of polycrystalline silicon.

Murthy et al. teaches that  $\text{HfB}_2$  and polysilicon (polycrystalline silicon) are art recognized equivalents for making a heat generating element (col. 7:1-3). Because these two materials were art recognized equivalents at the time the invention was made for making a heating element for an ink jet print head, one of ordinary skill in the art would have found it obvious to substitute a polycrystalline silicon heat generating element for the  $\text{HfB}_2$  heat generating element taught in Ozaki et al., for the purpose of ejecting a droplet of ink.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ozaki et al. (5,660,739) in view of Shirato et al. (4,458,256) and Nakata (EP-764531), as applied to claims 11, 14, 15 and 21/11 above, and further in view of Matsumoto (4,429,321).

Ozaki et al., as modified, teaches the claimed invention with the exception of a driving circuit having a plurality of function devices for driving the heat generating elements provided with the substrate.

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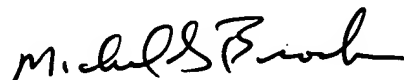
Looking at this figure, it can be seen that in all cases, the second region is closer to the nozzle than the first region.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael S. Brooke whose telephone number is 703-305-0262. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on 308-3126. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3431 for regular communications and 703-305-3431 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4900.



Michael S. Brooke  
Examiner  
Art Unit 2853

MSB  
March 18, 2003